Statement of Basis

Minor Air Quality Permit

Clay Rural Water System, Inc.
Wakonda, South Dakota

South Dakota Department of Environment and Natural Resources

TABLE OF CONTENTS

Page

1.0 BACKGROUND

On June 21, 2012, the South Dakota Department of Environmental & Natural Resources (DENR) received an application for an air quality permit from Clay Rural Water System, Inc. (CRWS) in Wakonda, South Dakota. The Standard Industrial Classification Code (SIC) for this facility is – 4941.

On July 30, 2012, CRWS submitted an updated application. In addition to emergency operations, the generator would also be operated during peak shaving operations.

1.1 Equipment

Table 1-1 provides a list of the equipment located at the site and that may require an air permit.

Table 1-1 – Description of Permitted Units, Operations and Processes

Unit	Description	Maximum Operating Rate	Control Device
#1	Generator #1- 1995 Cummins Onan Model # 200 DFAA/79481E diesel fuel fired generator	380 hp	Not Applicable

2.0 New Source Performance Standards (NSPS)

DENR reviewed the federal new source performance standards (NSPS) in 40 CFR Part 60 and determined that the following may be applicable.

2.1 ARSD 74:36:07:88 – 40 CFR Part 60, Subpart IIII

DENR review of the NSPS determined 40 CFR Part 60, Subpart IIII may be applicable. Subpart IIII is applicable to owners and operators of stationary compression ignition (CI) internal combustion engines (ICE) that:

1. Commence construction after July 11, 2005 where the stationary CI ICE are manufactured after April 1, 2006 and are not fire pump engines; or
2. Modify or reconstruct their stationary CI ICE after July 11, 2005.

The generator was constructed prior to the April 2006 deadline. Therefore, this generator is not applicable to this subpart.

2.2 ARSD 74:36:07 – 40 CFR Part 60, Subpart JJJJ

DENR review of the NSPS determined 40 CFR Part 60, Subpart JJJJ may be applicable. For the purposes of this subpart, the date construction commences is the date the engine is ordered by the owner or operator. Subpart JJJJ is applicable to owners and operators of stationary spark ignition (SI) internal combustion engines (ICE) that commence construction after June 12, 2006, where the stationary SI ICE are manufactured:

1. On or after July 1, 2007, for engines with a maximum engine power greater than or equal to 500 horsepower (except lean burn engines with a maximum engine power greater than or equal to 500 horsepower and less than 1,350 horsepower);
2. On or after January 1, 2008, for lean burn engines with a maximum engine power greater than or equal to 500 horsepower and less than 1,350 horsepower;
3. On or after July 1, 2008, for engines with a maximum engine power less than 500 horsepower;
4. On or after January 1, 2009, for emergency engines with a maximum engine power greater than 19 kilowatts (25 horsepower); or
5. Owners and operators of stationary SI ICE that commence modification or reconstruction after June 12, 2006.

The generator was constructed prior to 2006. Therefore, this generator is not applicable to this subpart.

3.0 New Source Review (NSR)

ARSD 74:36:10:01 states that New Source Review (NSR) regulations apply to areas of the state which are designated as nonattainment pursuant to the Clean Air Act for any pollutant regulated under the Clean Air Act. The CRWS, located in Wakonda, SD, is in attainment or unclassifiable for all the pollutants regulated under the Clean Air Act. Therefore, the CRWS is not subject to NSR review.

4.0 Prevention of Significant Deterioration

Any stationary source which emits or has the potential to emit 250 tons per year or more of any air pollutant is considered a major source and is subject to prevention of significant deterioration (PSD) requirements (ARSD 74:36:09 – 40 CFR. Part 52.21(b)(1)). Any stationary source which emits or has the potential to emit 100 tons per year or more of any air pollutant and is one of the 28 named PSD source categories is subject to PSD requirements (ARSD 74:36:09 – 40 CFR. Part 52.21(b)(1)). The following is a list of regulated pollutants under the PSD program:

1. Total suspended particulate (PM);
2. Particulate matter with a diameter less than or equal to 10 microns (PM10);
3. Particulate matter with a diameter less than or equal to 2.5 microns (PM2.5);
4. Sulfur dioxide (SO_2);
5. Nitrogen oxides (NO_x);
6. Carbon monoxide (CO);
7. Ozone – measured as volatile organic compounds (VOCs);
8. Lead;
9. Greenhouse gases (carbon dioxide, nitrous oxide, methane, etc.)
10. Fluorides;
11. Sulfuric acid mist;
12. Hydrogen sulfide;
13. Reduced sulfur compounds; and
14. Total reduced sulfur.

If the source is considered one of the 28 named PSD source categories listed in Section 169 of the federal Clean Air Act, the major source threshold is 100 tons per year of any regulated air pollutant, except for greenhouse gases. The major source threshold for all other sources is 250 tons per year of any regulated air pollutant, except for greenhouse gases.

According to the Clean Air Act, once a pollutant is regulated under any part of the Act, (as was the case with greenhouse gas emissions after the motor vehicle regulations were finalized in March 2010) major new sources or major modifications are subject to the PSD program and Title V air quality operating permit program. Under the Clean Air Act, PSD and Title V air quality operating permits are required for all sources that emit a regulated air pollutant above 100 or 250 tons per year, depending on the source. This threshold, if applied to greenhouse gases, would greatly increase the number of facilities requiring a PSD review or Title V air quality operating permit. Based on administrative necessity, EPA increased these thresholds through the "Tailoring Rule."

On May 13, 2010, EPA issued the final version of the "Tailoring Rule" for greenhouse gas emissions. The major source threshold for greenhouse gases is listed below:

1. New PSD source because of a criteria air pollutant, the major source threshold for greenhouse gases is 75,000 tons per year of carbon dioxide equivalent or more;
2. New PSD source if greenhouse gas emissions are 100,000 tons per year of carbon dioxide equivalent or more;
3. For an existing PSD source because of a criteria air pollutant, a major modification for greenhouse gases is an increase of 75,000 tons per year of carbon dioxide equivalent or more;
4. For an existing non-PSD source that has the potential to emit 100,000 tons per year of carbon dioxide equivalent emissions or more, a major modification for greenhouse gases is an increase of 75,000 tons per year of carbon dioxide equivalent or more; and
5. In addition to subsection (2) and (4), a specific greenhouse gas, without calculating the carbon dioxide equivalent, also needs to emit greater than 100 or 250 tons per year, whichever is applicable, to be regulated.

4.1 Potential Emissions

DENR uses stack test results to determine air emissions whenever stack test data is available from the source or a similar source. When stack test results are not available, DENR relies on manufacturing data, material balance, EPA's Compilation of Air Pollutant Emission Factors (AP-42, Fifth Edition, Volume 1) document, the applicant's application, or other methods to determine potential air emissions.

Potential emissions for each applicable pollutant are calculated from the maximum design capacity listed in the application and assuming the unit operates every hour of every day of the year, while using the fuel that will emit the greatest emissions. Potential emissions are not realistic of the actual emissions and are used only to identify which air quality permit and requirements CRWS is required to meet.

4.1.1 Potential Emissions – Generator

The facility indicated it had one non-emergency generator on-site. The generators produce emissions from the burning of fuel. Table 4-1 displays the emission factors as derived from the Compilation of Air Pollutant Emission Factors (AP-42, Fifth Edition, Volume 1, Chapter 3, Section 3.3-1.

Table 4-1 – Fuel Emissions Factor for Generators

	PM_{10}	**SO_2 [1]**	**NOx**	**CO**	**VOC**
Diesel Fuel – Engine (lb/MMBtu)	0.31	0.05	4.41	0.95	0.36

1 – Sulfur oxide emissions are a function of the sulfur content in the fuel (1.01 x Sulfur Content). During the combustion process, essentially all the sulfur in the fuel is oxidized to sulfur dioxide. The sulfur emission rate is based up a sulfur content of 0.05%.

The application lists the generators' output in terms of horsepower (hp). DENR converted this unit's output rating to an estimated heat input rating based on the conversion factors of 3,413 Btus per hour per kilowatt, 0.746 kilowatts per horsepower, and 1,000,000 Btus per MMBtus and the generator efficiency in equation 4-1. The results of the conversions are shown in Table 4-2 below.

Equation 4-1– Generator Conversion

$$Potential\left[\frac{tons}{year}\right] = Output\,[hp]\; x\; 0.746\left[\frac{kilowatts}{hp}\right] \times 3{,}413\left[\frac{Btus}{kilowatt}\right] \div 1{,}000{,}000\left[\frac{Btus}{MMBtus}\right] \div efficiency$$

Table 4-2 – Engine Specifications

Unit	**Output Capacity (hp)**	**Efficiency**	**Estimated heat input Capacity (MMBtu/hr)**
Unit #1 – Generator 1	380	35%	2.8

As defined in the New Source Performance Standard Subpart IIII, a generator that supplies power to an electric grid or supplies power as part of a financial arrangement with another entity (e.g. peak shaving) is not considered an emergency generator. The application states that the generator is used for non-emergency use. Therefore, non-emergency electrical generators' potential emissions will be based on the unit operating 8,760 hours per year instead of 500 hours used for emergency generators.

Equation 4-2 calculates the generators' potential emissions of each pollutant based on the capacities (heat input), the listed emission factor, and 8,760 operating hours per year.

Equation 4-2– Generator Potential Emissions

$$Potential\left[\frac{tons}{year}\right] = input\ capacity\left[\frac{MMBtu}{hour}\right]\; x\; emission\ factor\left[\frac{lbs}{MMBtu}\right] \times 8{,}760\left[\frac{hours}{year}\right] \div 2{,}000\left[\frac{lbs}{ton}\right]$$

Using Equation 4-2, DENR calculated the potential emissions for the generator. The results are shown in Table 4-3.

Table 4-3 - Potential Uncontrolled Emissions from Generators (tons/year)

Unit	PM10	SO_2	NO_x	CO	VOC
#1 – Generator #1	3.8	0.6	54.1	11.7	4.4

CRWS does not meet the 250 tons per year threshold and is not one of the 28 named PSD source categories. Therefore, CRWS is considered a minor source under the PSD program and is not subject to PSD requirements.

4.1.2 Potential to Emit for Greenhouse Gases

The next step is to determine if CRWS has the potential to emit 100,000 tons per year of carbon dioxide equivalent emissions or more. The six regulated greenhouse gases are the following:

1. Carbon dioxide;
2. Nitrous oxide;
3. Methane;
4. Hydrofluorocarbons;
5. Perfluorocarbons; and
6. Sulfur hexafluoride.

AP42 Section 3.4 does not contain emission factors for nitrous oxide or methane. Therefore, the greenhouse gas emission factors for firing the units with distillate oil are from AP-42 Tables 1.3-3, 1.3-8, 1.3-12 and are listed below:

1. Carbon dioxide = 22,300 pounds per 1,000 gallons;
2. Nitrous oxide = 0.26 pounds per 1,000 gallons;
3. Methane = 0.22 pounds per 1,000 gallons.

Equation 4-3– Annual distillate oil for each unit

$$Potential\left(\frac{gallons}{yr}\right) = MaximumHeatInput\,\frac{MMBtus}{hour} \times 8{,}760\,\frac{hours}{year} \div 0.14\,\frac{MMBtus}{gallon}$$

Using Equation 4-4, the appropriate emission factors and operating rates were used to determine the potential greenhouse gas emissions. In the case of the greenhouse gases, the result of Equation 4-4 needs to be multiplied by 1, 310, and 21 for carbon dioxide, nitrous oxide, and methane, respectively, to convert the results to carbon dioxide equivalent. The potential emissions for the greenhouse gases are summarized in Table 4-4.

Equation 4-4 – Potential emissions

$$Potential\left(\frac{tons}{yr}\right) = Annual\ Fuel\left(\frac{gallons}{year}\right) \times Factor\left(\frac{lbs}{1{,}000\,gallons}\right) \div 2{,}000\,\frac{lbs}{ton}$$

Table 4-4 –Greenhouse Gas Potential Emissions (tons per year)

Description	Capacity (MMBtu/hr)	Carbon Dioxide	Nitrous Oxide	Methane	Carbon Dioxide Equivalent
#1 – Generator #1	2.8	1,954	7.06	0.4	1,962

CRWS is considered an existing non-PSD source with the potential to emit less than 100,000 tons per year of carbon dioxide equivalent emissions. Therefore, CRWS is considered a minor source for greenhouse gases under the PSD program. CRWS is not applicable to the PSD program for greenhouse gases.

5.0 National Emission Standards for Hazardous Air Pollutants

DENR reviewed the national emission standards for hazardous standards and determined the proposed amendment to the minor air quality permit is not applicable to any standards under 40 CFR Part 61.

6.0 Maximum Achievable Control Technology Standards

6.1 Potential HAP Emissions

The federal Maximum Achievable Control Technology Standards are applicable to both major and area sources of hazardous air pollutants. A major source of hazardous air pollutants is defined as having the potential to emit 10 tons or more per year of a single hazardous air pollutant or 25 tons per year or more of a combination of hazardous air pollutants. An area source is a source that is not a major source of hazardous air pollutants.

DENR uses stack test results to determine air emissions whenever stack test data is available from the source or a similar source. When stack test results are not available, DENR relies on manufacturing data, material balance, EPA's Compilation of Air Pollutant Emission Factors (AP-42, Fifth Edition, Volume 1) document, the applicant's application, or other methods to determine potential air emissions.

6.1.1 Potential HAP Emissions – Generators

The potential for generators to emit HAPs can be calculated using the same assumptions outlined in 4.1.1. The emission factor for diesel engines for HAPs with maximum operating rates less than 600 horsepower is 0.0037 pounds per million Btus. The total potential emissions can be calculated using Equation 4-2. The results for the generators are listed in Table 6-1.

Table 6-1 – Potential HAPs Emissions for Generators (tons/year)

Unit	HAPs
#1 – Generator #1	0.05

Based on Table 6-1, CRWS is considered an area source of HAP's.

6.2 MACT Standards

DENR reviewed the Maximum Achievable Control Technology (MACT) standards under 40 CFR Part 63 and determined the following need to be reviewed further to determine if they are applicable.

6.2.1 40 CFR Part 63 Subpart ZZZZ

In accordance with 40 CFR Part 63 Subpart ZZZZ—National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (RICE) an affected source is any existing, new, or reconstructed stationary reciprocating internal combustion engines located at a major or area source of hazardous air pollutant emissions, excluding stationary reciprocating internal combustion engines being tested at a stationary reciprocating internal combustion engines test cell/stand (40 CFR § 63.6590.

A stationary RICE located at an area source of HAP emissions, a stationary RICE is existing if you commenced construction or reconstruction of the stationary RICE before June 12, 2006.

Generator #1 was constructed prior to June 12, 2006 and is located at an area source, therefore the generator is considered an existing reciprocating internal combustion engine and applicable to this subpart.

7.0 State Requirements

Any source operating in South Dakota that meets the requirements of the Administrative Rules of South Dakota (ARSD) 74:36:05:03 is required to obtain a Title V air quality permit. CRWS's particulate matter, sulfur dioxide (SO2), nitrogen oxides (NOx), carbon monoxide (CO) and volatile organic compound (VOC) emissions are less than 100 tons per year, carbon dioxide equivalent (CO2) emissions are less than 100,000 tons per year and hazardous air pollutant emissions are less than 10 tons per year for a single hazardous air pollutant and 25 tons per year of a combination of hazardous air pollutant. Based on the emission estimates, CRWS is considered a minor source. Even a minor source may require a Title V permit if it is applicable to a New Source Performance Standard or a National Emission Standard for Hazardous Air Pollutants (MACT). CRWS is applicable to the NSPS standard Subpart IIII and MACT standard Subpart ZZZZ. However, as noted in Administrative Rules of South Dakota (ARSD) 74:36:07:88 and 40 CFR § 63.6585 (d), an area source (minor) is not required to obtain a Title V permit if the only reason for the Title V permit is the requirement of Subpart IIII and/or Subpart ZZZZ. Therefore, CRWS does not require a Title V permit because it is applicable to a federal standard.

Any source operating in South Dakota that meets the definition of a minor source under the ARSD 74:36:01:01(38) is required to obtain a minor air quality permit. In accordance with ARSD 74:36:04:02.01, a minor source is exempt from obtaining a minor source operating permit if the source has the potential to emit 25 tons per year or less of any criteria pollutant, except lead, before the application of control equipment. As shown in Table 4-3, the potential emissions from a single criteria air pollutant are greater than 25 tons per year. Therefore, CRWS is required to obtain a minor air quality permit.

7.1 State Particulate Emission Limits

ARSD 74:36:06:02 establish state emission limits for total suspended particulate matter and sulfur dioxide that is required to be permitted.

The maximum heat input value for the generator is 470 horsepower or approximately 3.2 million Btus per hour. ARSD 74:36:06:02(1)(a), notes a fuel burning unit with heat input less than 10

million Btus per hour may not exceed 0.6 pounds of particulate matter per million Btus of heat input. ARSD 74:36:06:02(2), the sulfur dioxide emission limit for a fuel burning unit is 3.0 pounds per million Btus heat input.

Table 7-1 and Table 7-2 compare the state total suspended particulate and sulfur dioxide limits with the potential emissions.

Table 7-1 Particulate Matter Emission Limit

Unit	Potential Emissions	State Emission Limit
#1-- Generator #1	0.3 pounds per million Btus	0.6 pounds per million Btus

Table 7-2 Sulfur Dioxide Emission Limit

Unit	Potential Emissions	State Emission Limit
#1-- Generator #1	0.05 pounds per million Btus	3.0 pounds per million Btus

ARSD 74:36:12:01 establishes a visible emission limit of 20 percent opacity for each unit. CRWS must control the opacity at less than 20 percent for the engine.

7.2 Compliance Assurance Monitoring

Compliance assurance monitoring is applicable to permit applications received on or after April 20, 1998, from major sources applying for a Title V air quality permit. CRWS is not applying for a Title V air quality permit, therefore this is not applicable.

7.3 Periodic Monitoring

Periodic monitoring is required for each emission unit that is subject to an applicable requirement at a source subject to the Title V air quality operating permit program. CRWS is not applying for a Title V air quality permit, therefore this is not applicable.

8.0 Recommendation

Based on the above findings, CRWS is not required to obtain a Title V air quality permit; however, CRWS is required to obtain a minor air quality permit. Based on information DENR received in the permit application, DENR recommends approval of a minor air quality permit for CRWS. Questions regarding this permit review should be directed to Ashley Brakke, Engineer I.